

REMARKS/ARGUMENTS:

Claims 13, 18-20, 27, and 34 are amended. Support for the amendment to the claims can be found at p. 19, lines 20-23 of Applicant's specification. Claims 13-15, 18-20, 23-37, and 39-41 are pending in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

The invention relates to a dry etching apparatus, a dry etching method, and a cleaning method adopted in the dry etching apparatus, and more particularly to a dry etching apparatus, a dry etching method, and a cleaning method adopted in the dry etching apparatus suitable for use in texturing the surface of a silicon substrate used in a solar cell or the like. (Applicant's specification, at p. 1, lines 9-14).

CLAIM REJECTIONS UNDER 35 U.S.C. § 112:

Claims 13-15, 18-20, 23-37, and 39-41 stand rejected under 37 C.F.R § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Applicant respectfully traverses this rejection as to the amended claims.

The Office states that the term "fine" in independent claims 13, 18, 20, and 34 is a relative term which renders these claims, and claims dependent thereon, indefinite. In response, Applicant deleted the term "fine" from these claims. Withdrawal of this rejection is thus respectfully requested.

The Office states that there is insufficient antecedent basis for the limitation "said plurality of long members" in claim 27. In response, Applicant changed "said plurality of long members" to --plurality of long members--. Withdrawal of this rejection is thus respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. § 102:

Claims 13, 14, 18, 19, 23-30, 32-36, 39, and 41 stand rejected under 35 U.S.C. 102(b) as being anticipated by Katsuhiro (JP 2000-261008). The Applicant respectfully traverses this rejection. Claim 13, as amended, is as follows:

A method for producing a solar cell comprising:
placing a substrate for a solar cell on an RF electrode provided inside a chamber, directly or through a tray;
covering said substrate with a plate with a distance, wherein said plate comprises an obstacle with a plurality of obstacle forming members that inhibit a part of gas and plasma from passing through said plate; and
forming textures on a surface of said substrate by using residues being chiefly composed of components of said substrate as an etching mask.

Applicant respectfully submits that Katsuhiro cannot anticipate or render claim 13 obvious, because Katsuhiro fails to teach or suggest "covering said substrate with a plate with a distance, wherein said plate comprises an obstacle with a plurality of obstacle forming members that inhibit a part of gas and plasma from passing through said plate; and forming textures on a surface of said substrate by using residues being chiefly composed of components of said substrate as an etching mask."

Katsuhiro teaches roughening the surface of a substrate by an etching method, wherein the mask screen is placed above a polycrystal silicon substrate. As part of this etching method, Katsuhiro teaches sticking a mask screen 15, which has fine openings, over a polycrystal silicon substrate 1 and performing the etching of a surface of the substrate 1 by the mask screen 15 (Katsuhiro, paragraph [0045]).

According to Katsuhiko's method, by sticking the mask screen 15 all over the surface of the silicon substrate 1 and performing the RIE etching method,

“not only uniform irregularity is obtained, but also reinforcement with sufficient N⁺ diffusion layer formed on it is obtained. This is because generating a needlelike black silicon is much controlled comparing with the case where there is not a mask screen” (Katsuhiko, paragraph [0046]).

Stated differently, in the case where a mask screen is not provided, the needlelike black silicon is considerably generated. As a result, neither uniform irregularity nor reinforcement in the N⁺ diffusion layer is obtained.

Obtaining the distance between the screen and substrate, as the Office suggests, causes the above-mentioned problems. And this would be contrary to Katsuhiko's purpose. Thus, Applicant respectfully submits that a person of ordinary skill in the art would be discouraged from employing the arrangement discussed above.

Furthermore, Katsuhiko's mask screen is a “mask” that is not a plate to confine etching residues such as that of the present invention. If it were arranged with a distance between the mask screen and substrate, the mask screen would not work as a mask.

In the present invention, residues are formed and the surface of the substrate is roughened by covering the substrate with a plate keeping a distance and performing dry etching. That is, the present invention comprising “covering said substrate with a plate with a distance” allows that “there can be achieved an effect that the silicon compounds generated during etching are trapped within a space between the silicon substrate 1 and the plate 15, which makes it easier for the residues, chiefly composed of silicon, to be formed on the silicon substrate 1. Hence,

not only the formation of the residues, but also the formation of the surface texture 2 can be promoted at the same time.” (Applicant’s specification, at p. 19, line 20-p. 20, line 5).

In light of the foregoing, Applicant respectfully submits that Katsuhiro could not have anticipated or rendered claim 13 obvious, because the Katsuhiro fails to teach or suggest each and every claim limitation. Claims 14 and 23-30 depend from claim 13 and cannot be anticipated or rendered obvious for at least the same reasons as claim 13. Claims 18, 32-36, 39, and 41, similarly, require “covering said substrate with a plate with a distance,” and therefore, cannot be anticipated or rendered obvious over Katsuhiro for reasons discussed above. Withdrawal of this rejection is thus respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. § 103:

Claims 15, 31, 40, and 41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Katsuhiro. The Applicant respectfully traverses this rejection.

Claims 15, 31 and 40, 41 depend from claims 13 and 34, respectively, and are therefore, patentable over Katsuhiro for at least the same reasons discussed above. Withdrawal of this rejection is thus respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (310) 785-4600 to discuss the steps necessary for placing the application in condition for allowance.

Appl. No. 10/650,505
Amdt. Dated September 4, 2007
Reply to Office Action of June 1, 2007

Attorney Docket No. 81872.0051
Customer No.: 26021

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

Date: September 4, 2007

By: 

Lawrence J. McClure
Registration No. 44,228
Attorney for Applicant(s)

1999 Avenue of the Stars, Suite 1400
Los Angeles, California 90067
Phone: 310-785-4600
Fax: 310-785-4601